

SEQUENCE LISTING

<110> Schmidt, Alexander C.
Skiadopoulos, Mario H.
Collins, Peter L.
Murphy, Brian R.
Bailly, Jane E.
Durbin, Anna P.

<120> Attenuated Human-Bovine Chimeric Parainfluenza Virus (PIV) Vaccines

<130> Nih-0376

<140> 10/030,544

<141> 2002-01-08

<150> PCT/US00/17066

<151> 2000-06-15

<150> 60/143,134

<151> 1999-07-09

<160> 31

<170> PatentIn version 3.1

<210> 1

<211> 7

<212> DNA

<213> Artificial Sequence

<220>

<223> Sequence flanking sites of sequence polymorphism in BPIV3 Ka

<400> 1

actggtt

7

<210> 2

<211> 12

<212> DNA

<213> Artificial Sequence

<220>

<223> Sequence flanking site for introduction of Sgr A1 site for rBPIV3
Ka

<400> 2

tccaacattg ca

12

<210> 3

<211> 12

<212> DNA

<213> Artificial Sequence

<220>

<223> Sequence flanking site for introduction of Sgr A1 site for rBPIV3
s

<400> 3

tccaccggtg ca

12

<210> 4

<211> 12

<212> DNA

<213> Artificial Sequence

<220>

<223> Sequence flanking site for introduction of Sgr A1 site for rHPIV3
' JS

<400> 4
 cggacgtatc ta 12

<210> 5
 <211> 12
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Sequence flanking site for introduction of sgr A1 site for rHPiV3
 s

<400> 5
 cgcaccggtg ta 12

<210> 6
 <211> 10
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Sequence flanking site for introduction of Bsi W1 site for rBPiV3
 Ka

<400> 6
 gatataaaga 10

<210> 7
 <211> 10
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Sequence flanking site for introduction of Bsi W1 site for rBPiV3
 s

<400> 7
 gacgtacgga 10

<210> 8
 <211> 10
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Sequence flanking site for introduction of Bsi W1 site for rHPiV3
 JS

<400> 8
 gacaaaagg 10

<210> 9
 <211> 10
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Sequence flanking site for introduction of Bsi W1 site for rHPiV3
 s

<400> 9
 gacgtacggg 10

<210> 10
 <211> 11
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Sequence flanking N gene start codon

 <400> 10
 caaaaatggt g 11

 <210> 11
 <211> 12
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Sequence flanking N gene stop codon

 <400> 11
 gcaactaatc ga 12

 <210> 12
 <211> 12
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Sequence flanking introduced restriction site at N gene start codon

 <400> 12
 taaccatggt ga 12

 <210> 13
 <211> 12
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Sequence flanking introduced restriction site at N gene stop codon

 <400> 13
 gcacttaagc ac 12

 <210> 14
 <211> 12
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Sequence flanking mutation to restore context for N gene start codon

 <400> 14
 caaaaatggt ga 12

 <210> 15
 <211> 12
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Sequence flanking mutation to restore context for N gene stop codon

 <400> 15
 gcaactagtc ga 12

 <210> 16

<211> 40
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Sequence flanking N gene start codon in rJS

 <400> 16
 ggaactctat aatttcaaaa atgttgagcc tatttgatac 40

 <210> 17
 <211> 40
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Sequence flanking N gene start codon in cKa and cSF

 <400> 17
 ggaactctat aatttcaaaa atgttgagtc tattcgacac 40

 <210> 18
 <211> 40
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Sequence flanking N gene start codon in Ka and SF

 <400> 18
 gaaatcctaa gactgtaatc atgttgagtc tattcgacac 40

 <210> 19
 <211> 40
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Sequence flanking N gene stop codon in rJS

 <400> 19
 ttaacgcatt tggaagcaac taatcgaatc aacattttaa 40

 <210> 20
 <211> 40
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Sequence flanking N gene stop codon in cKa and cSF

 <400> 20
 tcagtgcatt cggaagcaac tagtcgaatc aacattttaa 40

 <210> 21
 <211> 40
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Sequence flanking N gene stop codon in Ka and SF

 <400> 21
 tcagtgcatt cggaagcaac tagtcacaaa gagatgacca 40

 <210> 22
 <211> 15456

<212> DNA

<213> Bovine Parainfluenza Virus 3 (Ka strain)

<400> 22

```
accaaacaag agaagagact tgcttgggaa tattaattca aataaaaatt aacttaggat      60
taaagaactt taccgaaagg taaggggaaa gaaatcctaa gactgtaatc atgttgagtc      120
tattcgacac attcagtgcg cgtaggcagg agaacataac gaaatcagct ggtggggctg      180
ttattcccg gcaaaaaaac actgtgtcta tatttgctct tggaccatca ataacagatg      240
acaatgataa aatgacattg gctcttctct ttttgtctca ttcttttagac aatgaaaagc      300
agcatgcgca aagagctgga tttttagttt ctctgttatt aatggcttat gccaacccag      360
aattatattt aacatcaaat ggtagtaatg cagatgttaa atatgttatt tacatgatag      420
agaaaagacc aggaagacag aaatatggtg ggtttgcgt caagactaga gagatggttt      480
atgaaaagac aactgattgg atgttcggga gtgatcttga gtatgatcaa gacaatatgt      540
tgcaaaatgg tagaagcact tctacaatcg aggatcttgt tcatactttt ggatatccat      600
cgtgtcttgg agcccttata atccaagttt ggataatact tgtaaggct ataaccagta      660
tatcaggatt gaggaagga ttctttactc ggtagaagc atttcgacaa gatggaacag      720
ttaaatccag tctagtgttg agcggtagt cagtagaaca aattggatca attatgaggt      780
cccaacagag cttggtaaca ctcatggtg aaacactgat aacaatgaac acaggcagga      840
atgatctgac aacaatagaa aagaatatac agattgtagg aaactacatc agagatgcag      900
gtcttgcttc atttttcaac acaatcagat atggcattga gactagaatg gcagctctaa      960
ctctgtctac ccttagaccg gatatcaaca gactcaaggc actgatcgag ttatatctat     1020
caaaggggcc acgtgctcct tttatatgca ttttgagaga tcccgtgcat ggtgagtttg     1080
caccaggcaa ctatcctgcc ctctggagtt atgcatggg ttagcagtt gtacaaaaca     1140
aggccatgca acagtatgta acaggaaggt cttatctgga tattgaaatg ttccaacttg     1200
gtcaagcagt ggcacgtgat gccagtcgc agatgagttc aatattagag gatgaactgg     1260
gggtcacaca agaagccaag caaagcttga agaaacacat gaagaacatc agcagttcag     1320
atacaacctt tcataagcct acagggggat cagccataga aatggcgata gatgaagaag     1380
cagggcagcc tgaatccaga ggagatcagg atcaaggaga tgagcctcg tcatccatag     1440
ttccttatgc atgggcagac gaaaccggga atgacaatca aactgaatca actacagaaa     1500
ttgacagcat caaaactgaa caaagaaaca tcagagacag gctgaacaaa agactcaacg     1560
agaaaaggaa acagagtgc ccgagatcaa ctgacatcac aaacaacaca aatcaaactg     1620
aatagatga tttgttcagt gcattcggaa gcaactagtc acaaagagat gaccactatc     1680
accagcaaca agtaagaaaa acttaggatt aatggaaatt atccaatcca gagacggaag     1740
gacaaatcca gaatccaacc acaactcaat caaccaaaga ttcattggaag acaatgttca     1800
aaacaatcaa atcatggatt cttgggaaga gggatcagga gataaatcat ctgacatctc     1860
atcgccctc gacatcattg aattcatact cagcaccgac tcccaagaaa acacggcaga     1920
cagcaatgaa atcaacacag gaaccacaag acttagcacg acaatctacc aacctgaatc     1980
caaaacaaca gaaacaagca aggaaaatag tggaccagct acaaaaaatc gacagtttgg     2040
ggcatcacac gaacgtgcc cagagacaaa agatagaaat gttaatcagg agactgtaca     2100
```

gggaggatat aggagaggaa gcagcccaga tagtagaact gagactatgg tcaactcgaag 2160
 aatctccaga agcagcccag atcctaacaa tggaacccaa atccaggaag atattgatta 2220
 caatgaagtt ggagagatgg ataaggactc tactaagagg gaaatgcgac aatttaaaga 2280
 tgttccagtc aaggtatcag gaagtgatgc cattcctcca acaaaacaag atggagacgg 2340
 tgatgatgga agaggcctgg aatctatcag tacatttgat tcaggatata ccagtatagt 2400
 gactgccgca aactagatg acgaagaaga actccttatg aagaacaaca ggccaagaaa 2460
 gtatcaatca acaccccaga acagtgacaa gggaattaaa aaaggggttg gaaggccaaa 2520
 agacacagac aaacaatcat caatattgga ctacgaactc aacttcaaag gatcgaagaa 2580
 gagccagaaa atcctcaaag ccagcacgaa tacaggagaa ccaacaagac cacagaatgg 2640
 atcccagggg aagagaatca catcctggaa catcctcaac agcgagagcg gcaatcgaac 2700
 agaatcaaca aaccaaacc atcagacatc aacctcgga cagaaccaca caatgggacc 2760
 aagcagaaca acctccgaac caaggatcaa gacacaaaag acggatggaa aggaaagaga 2820
 ggacacagaa gagagcactc gatttacaga aagggcgatt acattattac agaattcttg 2880
 tgtaatccaa tctgcagcaa aattagacct ataccaagac aagagagttg tgtgtgtggc 2940
 gaatgtccta aacaatgcag atactgcac aaagatagac ttcctagcag gtttgatgat 3000
 aggagtgtca atggatcatg ataccaaatt aaatcagatt cagaacgaga tattaagttt 3060
 gaaaactgat cttaaaaaga tggatgaatc acatagaaga ctaattgaga atcaaaaaga 3120
 acaattatca ctgatcacat cattaatctc aaatcttaa attatgacag agagaggagg 3180
 gaagaaggac caaccagaac ctagcgggag gacatccatg atcaagacaa aagcaaaaaga 3240
 agagaaaata aagaaagtca ggtttgacct tcttatggaa acacagggca tcgagaaaaa 3300
 catcctgac ctctatagat caatagagaa aacaccagaa aacgacacac agatcaaatc 3360
 agaaataaac agattgaatg atgaatccaa tgccactaga ttagtaccta gaagaataag 3420
 cagtacaatg agatcattaa taataatcat taacaacagc aatttatcat caaaagcaaa 3480
 gcaatcatat atcaacgaac tcaagctctg caagagtgc gaggaagtgt ctgagttgat 3540
 ggacatgttc aatgaggatg tcagctccca gtaaaccgcc aaccaagggt caacaccaag 3600
 aaaaccaata gcacaaaaca gccaatcaga gaccaccca atacaccaa ccaatcaaca 3660
 cataacaaag atctccagat catagatgat taagaaaaac ttaggatgaa aggactaatc 3720
 aatcctccga aacaatgagc atcaccaact ccacaatcta cacattccca gaatcctctt 3780
 tctccgagaa tggcaacata gagccgttac cactcaaggt caatgaacag agaaaggcca 3840
 tacctcatat tagggttgtc aagataggag atccgcccac acatggatcc agatatctgg 3900
 atgtcttttt actgggcttc tttgagatgg aaagggtcaa agacaggtat gggagcataa 3960
 gtgatctaga tgatgatcca agttacaagg tttgtggctc tggatcattg ccacttgggt 4020
 tggctagata caccggaat gatcaggaac tcctacaggc tgcaaccaag ctcgatatag 4080
 aagtaagaag aactgtaaag gctacggaga tgatagttta cactgtacaa aacatcaaac 4140
 ctgaactata tccatggtcc agtagattaa gaaaagggat gttatttgac gctaataagg 4200
 ttgcacttgc tcctcaatgt cttccactag atagagggat aaaattcagg gtgatatttg 4260

tgaactgcac agcaattgga tcaataactc tattcaaaat ccctaagtcc atggcattgt	4320
tatcattgcc taatacaata tcaataaatc tacaagtaca tatcaaaaca ggagttcaga	4380
cagattccaa aggagtagtt cagattctag atgaaaaagg tgaaaaatca ctaaatttca	4440
tggttcatct cgggttgatc aaaaggaaga tgggcagaat gtactcagtt gaatattgta	4500
agcagaagat cgagaagatg agattattat tctcattggg attagttgga gggatcagct	4560
tccacgtcaa cgcaactggc tctatatcaa agacattagc aagtcaatta gcattcaaaa	4620
gagaaatctg ctatccccta atggatctga atccacactt aaattcagtt atatgggcat	4680
catcagttga aattacaagg gtagatgcag ttctccagcc ttcattacct ggcgaaattca	4740
gatactaccc aaacatcata gcaaaaaggg tcgggaaaat cagacagtaa aatcaacaac	4800
cctgatatcc aacattgcaa atcaggctac ccacaggaga aaaatcaaaa acttaggatc	4860
aaagggatca ccacgaaccc cggaaaacag ccaaacaaac caacacacaa atcacagaca	4920
aaaaggagaa ggcaactgcaa agaccgagaa aaacagaaac gcacacaacc aagcagagaa	4980
aagccaaagc ccgccattca caaacacacc aacaatcctg caaacaagca ccaaaacaga	5040
ggtcaaaaga caaagagcac cagatatgac catcacaacc acaatcatag ccatattact	5100
aataccccca tcattttgtc aaatagacat aacaaaactg caacgtgtag gtgtgttagt	5160
caacaatcct aaaggcatga agatttcaca aaatttcgaa acgagatacc tgatattaag	5220
tttgataccc aaaatagaga attcacactc atgtggggat caacagataa accaatacaa	5280
gaagttattg gatagattga taattcctct atatgatgga ttaaaattac aaaaagatgt	5340
aatagtagta agtcatgaaa cccacaacaa tactaatctt aggacaaaac gattccttgg	5400
agagataatt gggacaattg cgatagggat agccacttca gcacaaatca ccgcagcagt	5460
cgctcttgtc gaagctaaac aggcaaagtc agacatagaa aaactcaaag aggctataag	5520
agacacaaac aaggcagtac aatcgattca aagttctgta ggtaacctaa ttgttgagc	5580
taaatcagtt caagactatg tcaacaatga aattatacct tcaatcacia gattaggctg	5640
tgaagcagca gggttacaat tgggaattgc attgacacaa cattactcag aattaacaaa	5700
tatatattgt gataatatag gaacactgaa agaaaaagg ataaaattac aagggatagc	5760
atcattatat cacacaaaca taacggaaat atttactact tcaacagttg accaatatga	5820
tatttatgac ctattattca ctgagtcaat caagatgaga gtgatagatg ttgatttgag	5880
tgattactca attactcttc aagttagact tcctttatta actaaactat caaatactca	5940
aatttataaa gtagattcta tatcatacaa catccagggc aaagagtggg atattcctct	6000
tcccaatcac atcatgacaa aaggggcttt tctaggtggg gctgatatta aagaatgcat	6060
agaggcattc agcagttata tatgtccttc tgatccaggt tacatattaa atcacgagat	6120
agagaattgt ttatcagga acataacaca gtgtcctaag actgttgta catcagatgt	6180
ggtaccacga tacgcgtttg tgaatggtgg attaatgca aactgcataa caactacatg	6240
tacatgcaat ggaattgaca atagaattaa tcaatcacct gatcaaggaa ttaagatcat	6300
aacacataaa gaatgccagg taataggtat aaacggaatg ttattcaata ctaatagaga	6360
aggacatta gcaacttata catttgatga catcatatta aataactctg ttgcacttaa	6420
tccaattgat atatctatgg aactcaacaa ggcaaaaact gaattagaag aatcgaagga	6480

atggataaaag	aatcaaatc	aaaagttaga	ttccgttga	agttggtatc	aatctagtgc	6540
aacaatcacc	ataatcatag	tgatgataat	aattctagtt	ataatcaata	taacaattat	6600
tgtagtcata	atcaaattcc	atagaattca	ggggaaagat	caaaacgaca	aaaacagtga	6660
gccgtatata	ctgacaaata	gacaataaga	ctatacacga	tcaaataata	aaagtacaaa	6720
aaacttagga	acaaagttgt	tcaacacagc	agcaccgaat	agaccaaaag	gcagcgcaga	6780
ggcgacacca	aactcaaaaa	tggaatattg	gaaacacaca	aacagcataa	ataacaccaa	6840
caatgaaacc	gaaacagcca	gaggcaaaca	tagtagcaag	gttaciaata	tcataatgta	6900
caccttctgg	acaataacat	taacaatatt	atcagtcatt	tttataatga	tattgacaaa	6960
cttaattcaa	gagaacaatc	ataataaatt	aatgttgag	gaaataagaa	aagaattcgc	7020
ggcaatagac	accaagattc	agaggacttc	ggatgacatt	ggaacctcaa	tacagtcagg	7080
aataaataca	agacttctca	caattcagag	tcattgtcaa	aactatatcc	cactatcatt	7140
aacacaacaa	atgtcagatc	tcagaaaatt	tatcaatgat	ctaacaata	aaagagaaca	7200
tcaagaagtg	ccaatacaga	gaatgactca	tgatagaggt	atagaacccc	taaatccaaa	7260
caagttctgg	aggtgtacat	ctggtaaacc	atctctaaca	agtagtccta	agataaggtt	7320
aataccagga	ccaggtttat	tagcaacatc	tactacagta	aatggctgta	ttagaattcc	7380
atcggttagta	atcaatcatc	taatctatgc	ttacacctct	aatcttatta	cccagggctg	7440
tcaagatata	gggaaatctt	accaagtact	acaaataggg	ataattacta	taaattcgga	7500
cctagtacct	gatttaaacc	ccagagtcac	acatacattt	aatattgatg	ataatagaag	7560
atcttgctct	ctggcactat	tgaatacaga	tgtttatcag	ttatgctcaa	caccaaaggt	7620
tgatgaaaga	tccgattatg	catcaacagg	tattgaggat	attgtacttg	acattgtcac	7680
taataatgga	ttaattataa	caacaagggt	tacaataaat	aatataactt	ttgataaacc	7740
gtatgcagca	ttgtatccat	cagtgggacc	aggaatctat	tataaggata	aagttatatt	7800
tctcgatat	ggagggtctag	agcatgaaga	aaacggagac	gtaatatgta	atacaactgg	7860
ttgtcctggc	aaaacacaga	gagactgtaa	tcaggcttct	tatagcccat	ggttctcaaa	7920
taggagaatg	gtaaactcta	ttattgttgt	tgataaaggc	atagatgcaa	cttttagctt	7980
gagggtgtgg	actattccaa	tgagccaaaa	ttattgggga	tcagaaggaa	gattactttt	8040
attaggtgac	agaatataca	tatatactag	atccacaagt	tggcacagta	aattacagtt	8100
aggggtaatt	gatatttctg	attatactaa	tataagaata	aattggactt	ggcataatgt	8160
actatcacgg	ccagggaatg	atgaatgtcc	atggggtcac	tcattgccag	acggatgtat	8220
aacaggagtt	tacactgatg	catatccgct	aaacccatcg	gggagtgttg	tatcatcagt	8280
aattcttgat	tcacaaaagt	ctagagaaaa	cccaatcatt	acttactcaa	cagctacaaa	8340
tagaataaat	gaattagcta	tatataacag	aacacttcca	gctgcatata	caacaacaaa	8400
ttgtatcaca	cattatgata	aagggtattg	ttttcatata	gtagaaataa	atcacagaag	8460
tttgaatacg	tttcaaccta	tgttattcaa	aacagaagtt	ccaaaaaact	gcagctaaat	8520
tgatcatcgc	atatcggatg	caagatgaca	ttaaaagaga	ccaccagaca	gacaacacag	8580
gagacgatgc	aagatataaa	gaaataataa	aaaacttagg	agaaaagtgt	gcaagaaaaa	8640

tggacaccga	gtcccacagc	ggcacaacat	ctgacattct	gtaccctgaa	tgtcacctca	8700
attctcctat	agttaaagga	aagatagcac	aactgcatac	aataatgagt	ttgcctcagc	8760
cctacgatat	ggatgatgat	tcaatactga	ttattactag	acaaaaaatt	aaactcaata	8820
aattagataa	aagacaacgg	tcaattagga	aattaagatc	agtcttaatg	gaaagagtaa	8880
gtgatctagg	taaatatacc	tttatcagat	atccagagat	gtctagttaa	atgttccaat	8940
tatgtatacc	cggaaattaat	aataaaataa	atgaattgct	aagtaaagca	agtaaaacat	9000
ataatcaaat	gactgatgga	ttaagagatc	tatgggttac	tatactatcg	aagttagcat	9060
cgaaaaatga	tggaagtaat	tatgatatca	atgaagatat	tagcaatata	tcaaattgtc	9120
acatgactta	tcaatcagac	aaatgggtata	atccattcaa	gacatggttt	actattaagt	9180
atgacatgag	aagattacaa	aaagccaaaa	atgagattac	attcaatagg	cataaagatt	9240
ataatctatt	agaagaccaa	aagaatatat	tgctgatata	tccagaactc	gtcttaatat	9300
tagataaaca	aaattacaat	gggtatataa	tgactcctga	attggtacta	atgtattgtg	9360
atgtagttga	agggaggtgg	aatataagtt	catgtgcaaa	attggatcct	aagttacaat	9420
caatgtatta	taagggtaac	aatttatggg	aaataataga	tggactattc	tcgaccttag	9480
gagaaagaac	atttgacata	atatcactat	tagaaccact	tgcatatcg	ctcattcaaa	9540
cttatgaccc	ggttaaacag	ctcagggggg	ctttttttaa	tcacgtgtta	tcagaaatgg	9600
aattaatatt	tgacagctgag	tgtacaacag	aggaaatacc	taatgtggat	tatatagata	9660
aaattttaga	tgtgttcaaa	gaatcaacaa	tagatgaaat	agcagaaatt	ttctctttct	9720
tccgaacttt	tggacaccct	ccattagagg	cgagtatagc	agcagagaaa	gtagaaagt	9780
atatgtatac	tgagaaatgc	ttgaaatttg	atactatcaa	taaatgtcat	gctatttttt	9840
gtacaataat	tataaatgga	tatagagaaa	gacatgggtg	tcaatggcct	ccagttacat	9900
tacctgtcca	tgacatgaa	tttatcataa	atgcatacgg	atcaaattct	gccatatcat	9960
atgagaatgc	tgtagattat	tataagagct	tcataggaat	aaaatttgac	aagtttatag	10020
agcctcaatt	ggatgaagac	ttaactattt	atatgaaaga	taaagcatta	tccccaaaga	10080
aatcaaactg	ggacacagtc	tatccagctt	caaacctgtt	ataccgcact	aatgtgtctc	10140
atgattcacg	aagattgggt	gaagtattta	tagcagatag	taaatttgat	ccccaccaag	10200
tattagatta	cgtagaatca	ggatattggc	tggatgatcc	tgaatttaat	atctcatata	10260
gtttaaaaga	gaaagaaata	aaacaagaag	gtagactttt	tgcaaaaatg	acatacaaga	10320
tgagggctac	acaagtatta	tcagaaacat	tattggcgaa	taatataagg	aaattcttcc	10380
aagagaatgg	gatgggttaa	ggagaaattg	aattactcaa	gagactaaca	acaatatcta	10440
tgtctggagt	tccgcgggat	aatgaggtat	acaataattc	aaaaagtcac	acagaagaac	10500
ttcaagctta	taatgcaatt	agcagttcca	atztatcttc	taatcagaag	tcaaagaagt	10560
ttgaatttaa	atctacagat	atatacaatg	atggatacga	aaccgtaagc	tgcttcttaa	10620
cgacagatct	taaaaaatat	tgtttaaatt	ggaggtatga	atcaacagct	ttattcggtg	10680
atacttgtaa	tcagatatatt	gggttaaagg	aattatttaa	ttggctgcac	cctcgccttg	10740
aaaagagtac	aatatatggt	ggagatcctt	attgcccgcc	atcagatatt	gaacatttac	10800
cacttgatga	ccatcctgat	tcaggatttt	atgttcataa	tcctaaagga	ggaatagaag	10860

ggTTTTGCCA aaagttatgg acactcatat ctatcagtgc aatacattta gcagctgtca 10920
 aaatcgggtgt aagagttact gcaatgggtc aaggggataa tcaagccata gctgttacca 10980
 caagagtacc taataattat gattataaag ttaagaaaga gattgtttat aaagatgtgg 11040
 taagatTTTT tgattccttg agagaggtga tggatgatct gggtcagtga ctcaaactaa 11100
 atgaaactat aataagtagt aaaatgttta tatatagcaa aaggatatac tatgacggaa 11160
 gaatccttcc tcaggcatta aaagcattgt ctagatgtgt tttttggtct gaaacaatca 11220
 tagatgagac aagatcagca tcctcaaadc tggctacatc gtttgcaaag gccattgaga 11280
 atggctactc acctgtattg ggatatgtat gctcaatctt caaaaatadc caacagttgt 11340
 atatagcgct tggaatgaat ataaacccaa ctataaccca aaatattaaa gatcaatatt 11400
 tcaggaatat tcattggatg caatatgcct ccttaatccc tgctagtgtc ggaggattta 11460
 attatatggc catgtcaagg tgTTTTgtca gaaacattgg agatcctaca gtcgctgcgt 11520
 tagccgatat taaaagattt ataaaagcaa atttgttaga tcgaggtgtc ctttacagaa 11580
 ttatgaatca agaaccaggc gagtcttctt ttttagactg ggcctcagat ccctattcat 11640
 gtaacttacc acaatctcaa aatataacca ccatgataaa gaataaact gcaagaaatg 11700
 tactacagga ctcaccaaac ccattactat ctggattatt tacaagtaca atgatagaag 11760
 aggatgagga attagctgag ttcctaattg acaggagaat aatcctccca agagttgcac 11820
 atgacatttt agataattct cttactggaa ttaggaatgc tatagctggg atgttggata 11880
 caacaaaadc actaattcga gtagggataa gcagaggagg attaacctat aactatttaa 11940
 gaaagataag caactatgat cttgtacaat atgagacact tagtaaaact ttaagactaa 12000
 tagtcagtga caagattaag tatgaagata tgtgctcagt agacctagcc atatcattaa 12060
 gacaaaaaat gtggatgcat ttatcaggag gaagaatgat aaatggactt gaaactccag 12120
 atccttttaga gttactgtct ggagtaataa taacaggatc tgaacattgt aggatatgtt 12180
 attcaactga aggtgaaagc ccatatacat ggatgtattt accaggcaat cttaatatag 12240
 gatcagctga gacaggaata gcatcattaa gggtccttta ctttggatca gttacagatg 12300
 agagatctga agcacaatta gggatatca aaaatctaag caaacagct aaggctgcta 12360
 taagaatagc aatgatatat acttgggcat ttgggaatga cgaaatatct tggatggaag 12420
 catcacagat tgcacaaaac cgtgcaaact ttacattgga tagcttaaag attttgacac 12480
 cagtgacaac atcaacaaat ctatcacaca ggttaaaaga tactgctact cagatgaaat 12540
 tttctagtac atcacttatt agagtaagca ggttcacac aatatctaata gataatatgt 12600
 ctattaaaga agcaaatgaa actaaagata caaatcttat ttatcaacag gtaatgttaa 12660
 caggattaag tgtatttgaa tatctattta ggttagagga gagtacagga cataacccta 12720
 tggtcagtga tctacatata gaggatggat gttgtataaa agagagttac aatgatgagc 12780
 atatcaatcc ggagtctaca ttagagttaa tcaaatccc tgagagtaat gaatttatat 12840
 atgataagga cccttttaaag gatatagatc tatcaaaatt aatgggtata agagatcatt 12900
 cttatacaat tgacatgaat tactgggatg acacagatat tgtacatgca atatcaatat 12960
 gtactgcagt tacaatagca gataaatgt cgcagctaga tcgggataat ctttaaggagc 13020

tgggtgtgat tgcaaatgat gatgatatta acagtctgat aactgaatth ctgaccctag 13080
 atatactagt gtttctcaaa acatttggag gggtactcgt gaatcaatth gcatataccc 13140
 tttatggatt gaaaatagaa ggaagggatc ccatthggga ttatataatg agaacattaa 13200
 aagacacctc acattcagta cttaaagtat tatctaattc actatctcat ccaaaagtgt 13260
 ttaagagatt ttgggattgt ggagttttga atcctattta tggtcctaact actgctagtc 13320
 aagatcaagt taagcttgct ctctcgattt gcgagtactc cttggatcta tttatgagag 13380
 aatggttgaa tggagcatca cttgagatct atatctgtga tagtgacatg gaaatagcaa 13440
 atgacagaag acaagcattt ctctcaagac atcttgcctt tgtgtgttgt ttagcagaga 13500
 tagcatctth tggaccaaact ttattaaatc taacatatct agagagactt gatgaattaa 13560
 aacaatactt agatctgaac atcaaagaag atcctactct taaatatgtg caagtatcag 13620
 gactgttaat taaatcattc ccctcaactg ttacgtatgt aaggaaaact gcgattaagt 13680
 atctgaggat tcgtgggtatt aatccgcctg aaacgattga agattgggat cccatagaag 13740
 atgagaatat cttagacaat attgttaaaa ctgtaaatga caattgcagt gataatcaaa 13800
 agagaaataa aagtagttat ttctggggat tagctctaaa gaattatcaa gtcgtgaaaa 13860
 taagatccat aacgagtgat tctgaagtta atgaagcttc gaatgttact acacatggaa 13920
 tgacacttcc tcagggagga agttatctat cacatcagct gaggttattt ggagtaaaca 13980
 gtacaagttg tcttaaagct cttgaattat cacaaatctt aatgagggaa gttaaaaaag 14040
 ataaagatag actctthtta ggagaaggag caggagctat gttagcatgt tatgatgcta 14100
 cactcgggtc tgcaataaat tattataatt ctggtttaa tattacagat gtaattggtc 14160
 aacgggaatt aaaaatcttc ccatcagaag tatcattagt aggtaaaaa ctaggaaatg 14220
 taacacagat tcttaatcgg gtgaggggtgt tatttaattg gaatcccaat tcaacatgga 14280
 taggaaatat ggaatgtgag agtttaatat ggagtgaatt aaatgataag tcaattgggt 14340
 tagtacattg tgacatggag ggagcgatag gcaaatcaga agaaactgtt ctacatgaac 14400
 attatagtat tattaggatt acatatttaa tcggggatga tgatgttgct ctagtatcaa 14460
 aaattatacc aactattact ccgaattggt ctaaaatact ctatctatac aagttgtatt 14520
 ggaaggatgt aagtgtagt tcccttaaaa catccaatcc tgcctcaaca gagctthatt 14580
 taatttcaaa agatgcttac tgtactgtaa tggaaccag taatcttgtt ttatcaaaac 14640
 ttaaaaggat atcatcaata gaagaaaata atctattaaa gtggataatc ttatcaaaaa 14700
 ggaagaataa cgagtggta cagcatgaaa tcaaagaagg agaaaggat tatgggataa 14760
 tgaggccata tcatacagca ctgcaaattt ttgattcca aattaactta aatcacttag 14820
 ctagagaatt tttatcaact cctgatttaa ccaacattaa taatataatt caaagthtta 14880
 caagaacaat taaagatgtt atgttcgaat gggtaaatat cactcatgac aataaaagac 14940
 ataaattagg aggaagatat aatctattcc cgcttaaaaa taaggggaaa ttaagattat 15000
 tatcacgaag attagtacta agctggatat cattatcctt atcaaccaga ttactgacgg 15060
 gccgtthtcc agatgaaaaa ttgaaaaata gggcacagac cggatatgta tcattggctg 15120
 atattgattt agaactctta aagttattat caagaaatat tgtcaaaaat tacaagaac 15180
 acataggatt aatatcatac tggthtthtga ccaaagagg caaaatacta atgaagctta 15240

taggaggagt caaactacta ggaattccta aacagtacaa agagttagag gatcgatcat	15300
ctcaggggta tgaatatgat aatgaatttg atattgatta atacataaaa acataaaata	15360
aaacacctat tcctcaccca ttcacttcca acaaaatgaa aagtaagaaa aacatgtaat	15420
atatatatac caaacagagt ttttctcttg tttggt	15456

<210> 23
 <211> 15456
 <212> DNA
 <213> Bovine parainfluenza virus 3 (SF strain)

<400> 23	
accaaacaag agaagagact tgcttgggaa tattaattca aataaaaatt aacttaggat	60
taaagaactt taccgaaagg taaggggaaa gaaatcctaa gactgtaatc atgttgagtc	120
tattcgacac attcagtgcg cgtaggcagg agaacataac aaaatcagct ggtggggctg	180
ttattcccgg gcaaaaaaac actgtgtcta ttttgtctct tggaccatca ataacagatg	240
acaatgacaa aatgacattg gctcttctct ttttgtctca ttcttttagac aatgaaaagc	300
agcatgcgca aagagctgga tttttagttt ctctgttatc aatggcttat gccaacccag	360
aattatattt aacatcaaat ggtagtaatg cagatgttaa atatgtcatc tacatgatag	420
agaaagaccc aggaagacag aaatatggtg ggtttgtcgt caagactaga gagatggttt	480
atgaaaagac aactgactgg atgtttggga gtgatcttga gtatgatcaa gacaatatgt	540
tgcaaatgg tagaagcact tctacaatcg aggatcttgt tcatactttt ggatatccat	600
cgtgtcttgg agcccttata atccaggttt ggataatact tgttaaggct ataaccagta	660
tatcaggatt gaggaagga ttctttactc ggtagaagc atttcgacaa gatggaacag	720
ttaaattccag tctagtgttg agcgggtgat cagtagaaca aattggatca attatgaggt	780
cccaacagag cttggttaaca ctcatggtt aaacactgat aacaatgaac acaggcagga	840
atgacctgac aacaatagaa aagaatatac agattgtagg aaactacatc agagatgcag	900
gtcttgcttc atttttcaac acaatcagat atggcattga gactagaatg gcagctctaa	960
ctctgtctac ccttagaccg gacatcaaca gactcaaggc actgatagag ctatatctat	1020
caaaggggcc acgtgctcct tttatatgca ttttgagaga tcctgtgcat ggtgagtttg	1080
caccaggcaa ctatcctgcc ctctggagtt atgcgatggg tgtagcagtt gtacaaaaca	1140
aggccatgca acagtatgta acaggaaggt cctatctgga tattgaaatg ttccaactgg	1200
gtcaagcagt ggcacgtgac gccgagtcgc agatgagttc aatattagag gatgaactgg	1260
gggtcacaca agaagccaag caaagcttga agaaacacat gaagaacatc agcagttcag	1320
atacaacctt ctataagcct acagggggat cagccataga aatggcaata gatgaggaag	1380
cagagcagcc cgaatccaga ggagaccaag accaaggaga tgaacctcgg tcatccatag	1440
ttccttatgc atgggcagac gaaaccggga atgacaacca aactgaatca accacagaaa	1500
ttgacagcat caaaactgaa caaagaaaca tcagagacag gctgaacaaa agactcaacg	1560
agaaaaggaa acagagtaac ccgggatcaa ctgacatcac aaacaacaca aatcaaaactg	1620
aaatagatga tttattcagt gcattcggaa gcaactagtc acaaagagat gaccaccatc	1680
atcagcaaca agtaagaaaa acttaggatt aatggaaatt atccaatccg gagacggaag	1740

gacaaatcca gaatccaacc acaactcaat caaccaaaga ttcattggaag acaatgttca	1800
aaacaatcaa atcatggatt cttgggaaga gggatcagga gataaatcat ctgacatctc	1860
atcggccctc gacatcattg aattcatact caacaccgac tccaagaga acacggcaga	1920
cagcaatgaa atcaacacag gagccacaag acttagcacg acaatctacc aacttgagtc	1980
caaaacaaca gaaacaagca aggaaaatag tggaccagct aacaaaaatc gacagtttgg	2040
ggcatcacac gaacgtgcc aagagacaaa agatagaaat gttaatcaga agactgtaca	2100
gggaggatat aggagaggaa gcagcccaga tagtagaact gagactatgg tcaactcgagg	2160
aatctccaga agcagcccag atcctaacaa tggaacccaa atccaggaag atattgatta	2220
caatgaagtt ggagagatgg ataaggactc tactaagagg gaaatgagc aatttaaaga	2280
tgttccagtc aaggtatcag gaagtgatgc cattcctcca acaaaacaag atggagacgg	2340
tgatgatgga agaggcctgg aatctatcag tacatctgat tcaggatata ccagtatagt	2400
gactgccgca aactagatg acgaagaaga actccttatg aagaacaaca ggccaagaaa	2460
gtatcaatca acaccccaga acagtgacaa gggaattaaa aaagggagtg gaaggccaaa	2520
agacacagac aaacaatcac caatattgga ctacgaactc aactccaaag gatcgaagaa	2580
gagccagaaa atcctcaaag ccagcacgaa tacaggagaa ccaacaagat cacagagtgg	2640
atcccagggg aagagaatca catcctggaa catcctcaac agcgagagcg gcaatcgagc	2700
agaatcaaca aaccaaacc atcagacatc aatctcggga cagaaccaca caatgggacc	2760
aagcagaaca acctcagaac caaggaccaa gacacaaaag acggatggaa aggaaagaga	2820
ggacacagaa gagagcactc gatttacaga aagggcgatt acattattac agaactcttg	2880
tgtaatccaa tctgcagcaa aattagacct ataccaagac aagagagttg tgtgtgtggc	2940
gaatgtccta aacaatgcag atactgcac aaagatagac ttcctagcag gtttgatgat	3000
aggagtgtca atggatcatg atgtcaaatt aaatcagatt cagaacgaga tattaagttt	3060
aaaaactgat cttaagaaga tggatgaatc acatagaaga ctaattgaga atcaaaaaga	3120
acaattatca ctgatcacat cattaatctc aaatcttaaa atcatgacag agagaggagg	3180
gaagaaggac caaccagaac ctacggggag gacatccatg atcaagacaa aggcaaaaga	3240
agagagaata aagaaagtca ggtttgacct tcttatggaa acacagggca tcgagaaaaa	3300
catccctgac ctctacagat caatagagaa aacaccagaa aacgacacac agatcaaatc	3360
agaaataaac agattgaatg atgaatccaa tgccactaga ttagtaccta gaagaataag	3420
cagtacaatg agatcactaa taataatcat caacaacagc aatttatcat caaaagcaaa	3480
gcaatcatat atcaacgaac tcaagctctg caagagtgat gaggaagtgt ctgagttgat	3540
ggacatgttc aatgaggatg tcagctccca gtaaaccgcc aaccaagggt caacaccaag	3600
aaaaccaaca gcacaaaaca gccaaataaga gaccatccca acacaccgaa ccaatcaaca	3660
cataacaaag atcttttagat catagatgac taagaaaaac ttaggatgaa aggactgatc	3720
aatcctccaa aacaatgagc atcaccagct ccacaatcta cacattccca gaatcctctt	3780
tctccgagaa tggcaacata gagccgttac cactcaaggt caatgaacag agaaaggcca	3840
tacctcatat taggggtgtc aagataggag atccgcccaa acatggatcc agatatctgg	3900

atgtcttttt	actgggcttc	tttgaaatgg	aaaggtcaaa	agacaggtat	gggagcataa	3960
gtgatctaga	tgatgatcca	agttacaagg	tttgtggctc	tggatcattg	ccacttgggt	4020
tggctagata	cactggaaat	gatcaggaac	tcctacaggc	tgcaaccaag	ctcgatatag	4080
aagtaagaag	aactgtaaag	gctacggaga	tgatagttta	cactgtgcaa	aacatcaaac	4140
ctgaactata	tccatgggtc	agtagattaa	gaaaagggat	gttatttgac	gctaacaagg	4200
ttgcacttgc	tcctcaatgt	cttcactag	atagagggat	aaaattcagg	gtgatatttg	4260
tgaactgcac	agcaattgga	tcaataactc	tattcaaaat	ccccaagtcc	atggcattgt	4320
tatcattgcc	taatacaata	tcaataaatc	tacaagtaca	tatcaaaaca	ggaattcaga	4380
cagattccaa	aggagtagtt	cagattctag	atgaaaaagg	tgaaaaatca	ctaaatttca	4440
tggttcatct	cggttgatc	aaaaggaaga	tgggtagaat	gtactcagtt	gaatattgta	4500
agcagaagat	tgagaagatg	agattattat	tctcattggg	attagttgga	gggatcagct	4560
tccacgtcaa	cgcaactggc	tctatatcaa	agacattagc	aagtcaatta	gcatttaaaa	4620
gagaaatctg	ctatcccta	atggatctga	atccacactt	aaatttagtt	atatgggcat	4680
catcagttga	aattacaaga	gtagatgcaa	ttctccagcc	ttcattacct	ggcgaattca	4740
gatactaccc	aaacatcata	gcaaaaaggg	tcgggaaaat	cagacagtaa	aaccaacaac	4800
cctgacatcc	aacactgcaa	atcaggctac	ccacaggaga	aaaatcaaaa	acttaggatc	4860
aaagggatca	ccacaaaccc	cgggaaacag	ccaaaccaac	caacacacaa	atcacagaca	4920
aaaaggaaaa	ggcactgcaa	agaccgagaa	caagcagaac	gcacacaacc	aagcagagga	4980
aagccaaagc	ccgccattca	caaacacacc	aacaatccta	caaacaagca	ccaaaataga	5040
ggtcaaaaga	caaagagcat	cagatatgac	catcacaacc	ataatcatag	ccatactact	5100
aataccccta	tcattctgtc	aaatagacat	aacaaaactg	caacgtgtag	gtgtattagt	5160
caacaatccc	aaaggcatga	aaatttcaca	aaattttgaa	acgagatacc	tgatattaag	5220
tctgataccc	aaaatagaga	attcacactc	atgtggggat	caacagataa	accaatacaa	5280
gaagttattg	gatagattga	taattcctct	atatgatgga	ttaaaattac	aaaaagatgt	5340
aatagtagta	agtcatgaaa	cccataataa	tactaatctt	aggacaaaac	gattccttgg	5400
agagataatt	gggacaattg	cgatagggat	agccacctca	gcgcaaatca	ccgcagcagt	5460
cgctcttgtc	gaagctaaac	aggcaaggtc	agacatagaa	aaactcaaag	aagctataag	5520
agacacaaac	aaggcagtac	aatcgattca	aagttctgta	ggtaacctaa	ttgttgcagt	5580
taaatcagtt	caagactatg	tcaacaatga	aattgtacct	tcaatcacia	gattaggctg	5640
tgaagcagca	gggttacaa	tgggaattgc	actgacacaa	cattactcag	aattaacaaa	5700
tatatattgt	gataatatag	gaacactgaa	agaaaaaggg	ataaaattac	aggggatagc	5760
atcgttatat	catacaaaac	taacagaaat	atttactact	tcaacagttg	accaatatga	5820
tatttatgac	ctattattca	ctgaatcaat	caagatgaga	gtgatagatg	ttgatttgag	5880
tgattactca	attactcttc	aagttagact	tcctttatta	actaaactat	caaatactca	5940
gatttataaa	gtagattcta	tatcatacaa	catccagggc	aaagagtggg	atattcctct	6000
tcccaatcac	atcatgacaa	aaggggcttt	tctaggtggg	gctgatatta	aagaatgcat	6060
agaggcattc	agcagttata	tatgtccttc	tgatccaggt	tatatattaa	atcacgagat	6120

agagaattgt ttatcagggg acataacaca gtgtcctaag actgttggtta catcagatgt	6180
ggtaaccacga tacgcgtttg tgaatgggtgg attaatgca aactgcataa caactacatg	6240
tacatgcaat ggaattgaca atagaattaa tcaatcacct gatcaaggaa ttaagatcat	6300
aacacataaa gaatgccagg taataggtat aaacggaatg ttattcaata ctaatagaga	6360
agggacatta gcaacttata catttgatga cattatatta aataactctg ttgcacttaa	6420
tccaattgat atatctatgg aacttaacaa ggcaaaacta gaattagaag aatcgaagga	6480
atggataaag aaatcaaadc aaaagttaga ttccgttgga agttggtatc aatctagtgc	6540
aacaatcacc ataatcatag tgatgataat aattctatct ataatcaata taacaattat	6600
tgtagtacata atcaaattct atagaattaa gggggaaaat caaaacgaca aaaacagtga	6660
gccgtatata ctgacaaaata gacaataaga ctatacacga tcaaataatag aaagtacaaa	6720
aaacttagga acaaagttgt tcaacacagc agcagcgaac agacccaaag gcagcgcaga	6780
ggcgacaccg aacccaaaaa tggaatattg gaaacacaca aacagcaca aaaacaccaa	6840
caatgaaacc gaaacaacca gaggcaaaca cagtagcaag gttacaaata tcataatgta	6900
caccttcttg acaataacat caacaatatt attagtcatc ttataaatga tattgacaaa	6960
cttaattcaa gagaacaatc ataataaatt aatgtgtcag gaaataagaa aagaattcgc	7020
ggcaatagac accaagattc agaggacctc ggatgacatt ggaacctcaa tacagtcagg	7080
aataaatata agacttctca caattcagag tcatgttcaa aactatatcc cactatcact	7140
aacacaacaa atgtcagatc tcagaaaatt tatcaatgat ctaacaaata aaagagaaca	7200
tcaagaagtg ccaatacaga gaatgactca tgatagaggt atagaacccc taaatccaga	7260
caagttcttg aggtctacat ctggtaaccc atctctaaca agtagtccta agataagggt	7320
aataccaggg ccagggttat tagcaacatc tactacagta aatggctgta ttagaatccc	7380
atcggttagca atcaatcatt taatctacgc ttacacctct aatcttatca cccagggtg	7440
tcaaaatata gggaaatctt accaagtact acaaataagg ataattacta taaattcggg	7500
cctagtacct gatttaaadc ccagagtcac acatacatct aatattgatg ataataaggaa	7560
atcttgctct ctggcactat tgaatacaga tgtttatcag ttatgctcaa caccaaaagt	7620
tgatgagaga tccgattatg catcaacagg tattgaggat attgtacttg acattgtcac	7680
taataatgga ttaattataa caacaagggt tacaataaat aatataactt ttgataaacc	7740
gtatgcagca ttgtatccat cagtaggacc aggaatctat tataagggtg aagttatatt	7800
tctcgatat ggaggtctag agcatgaaga aaacggagac gtaatatgta atacaactgg	7860
ttgtcctggc aaaacacaga gagactgtaa tcaggcttct tatagcccat ggttctcaa	7920
taggagaatg gtaaaactct ttattgttgt tgataaaggc atagatgcaa ctttttagctt	7980
gaggggtgag actattccaa tgagccaaaa ttattgggga tcagaaggaa gattactttt	8040
attaggtgac agaataataa tatatactag atccacaagt tggcacagta aattacagtt	8100
aggggtaatt gatatttctg attataataa tataagaata aattggactt ggcataatgt	8160
actatcacgg ccaggaaatg atgaatgtcc atggggctat tcatgccag acggatgtat	8220
aacaggagtt tacactgatg catatccgct aaacccatcg gggagtgtg tatcatcagt	8280

aattcttgac	tcacaaaagt	ctagagaaac	ccaatcatta	cctactcaac	agctacaaat	8340
agaataaatg	aatttagctat	atataacaga	acacttccag	ctgcatatac	aacaacaaat	8400
ttgtatcaca	cattatgata	aagggtattg	ttttcatata	gtagaaataa	atcacagaag	8460
tttgaatacg	tttcaaccta	tgttattcaa	aacagaagtt	ccaaaaaact	gcagctaaat	8520
tgatcatcgc	atatcggatg	ccagatgaca	ttaaaagaga	ccaccagaca	gacaacacag	8580
gagatgatgc	aagatataaa	ggaataataa	aaaacttagg	agaaaagtgt	gcaagaaaaa	8640
tggaactga	atcccacagc	ggcacaacat	ctgacattct	gtaccctgaa	tgtcacctca	8700
attctcctat	agttaaagga	aaaatagcac	aactgcatac	aataatgagt	ttgccccaac	8760
cctacgatat	ggatgatgat	tcaatactga	ttattactag	acaaaaaatc	aaactcaata	8820
aattagataa	aagacaacgg	tcaattagga	aattaagatc	agtcttaatg	gaaagagtaa	8880
atgatcttgg	taaatacacc	tttatcagat	atccagaaat	gtctagttaa	atgttccaat	8940
tatgtatacc	cggaattaat	aataaaataa	atgaattgct	aagtaaagca	agtaaaacat	9000
ataatcaaat	gactgatgga	ttaagagatc	tatgggttac	tgtactatcg	aagttagcat	9060
cgaaaaatga	tggaagtaat	tatgatatac	atgaagatat	tagcaatata	tcaaattgtc	9120
acatgactta	ccaatcagac	aaatggtata	atccattcaa	gacatggttt	actattaagt	9180
atgacatgag	gagattacaa	aaagccaaaa	atgagattac	attcaatagg	cataaagatt	9240
ataatctatt	agaagaccaa	agaatatata	tgctgataca	tccagaactc	gtcttaatat	9300
tagataaaca	aaattacaat	gggtatataa	tgactcctga	attggtacta	atgtattgtg	9360
atgtagttga	agggaggtgg	aatataagtt	catgtgcaaa	attggatcct	aaattacaat	9420
caatgtatta	taaaggtaac	aatttatggg	aaataataga	tggactattc	ctgaccttag	9480
gagaaagaac	atttgacata	atatcactat	tagaaccgct	tgcattatcg	ctcattcaaa	9540
ctcatgaccc	ggttaaacag	ctcagagggg	cttttttaaa	tcacgtgtta	tcagaaatgg	9600
aatcaatatt	cgcagctgag	tgtacaacag	aggaaatacc	taatgtggat	tatatagata	9660
aaattttaga	tgtattcaaa	gaatcaacaa	tagatgaaat	agcagaaatt	ttctctttct	9720
tccgaacttt	tggaaccctt	ccattagagg	cgagtatagc	agcagagaaa	gtagaaagt	9780
atatgtacac	tgagaaatgt	ttgaaatttg	atactatcaa	taaatgtcat	gctatttttt	9840
gtacaataat	tataaatgga	tatagagaaa	gacatgggtg	tcaatggcct	ccagttacat	9900
tacctattca	tgcacatgaa	tttatcataa	atgcgtacgg	atcaaattct	gccatatcat	9960
atgaaaatgc	tgtagattat	tataagagct	tcataggaat	aaaatttgac	aagtttatag	10020
agcctcaatt	ggatgaagac	ttaactattt	atatgaaaga	taaagcatta	tccccaaaga	10080
aatctaactg	ggacacagtc	tatccagctt	caaacctgtt	ataccgcact	aatgtgtctc	10140
atgattcacg	aagattgggt	gaagtattta	tagcagatag	taaatttgat	ccccaccaag	10200
tattagatta	cgtagaatca	ggatattggc	tagatgatcc	tgaatttaat	atctcatata	10260
gtttaaaaga	gaaagaaata	aaacaagaag	gtagactttt	tgcaaaaatg	acatacaaga	10320
tgagagctac	acaagtatta	tcagaaacat	tattggcgaa	taatataggg	aaatccttcc	10380
aagagaatgg	gatgggttaa	ggagaaattg	aattactcaa	gagactgaca	acaatatcta	10440
tgtctggggg	tccgcgggtat	aatgaggtat	acaataattc	aaaaagtcac	acagaggaac	10500

ttcaagctta taatgcaatt agcagttcca atttatcttc taatcagaag tcaaagaagt 10560
 ttgaatttaa atcaacagat atatacaatg atggatacga aaccgtaagc tgcttcttaa 10620
 cgacagatct taaaaaatat tgtttaaatt ggaggtatga atcaacagct ttattcgggtg 10680
 atacttgtaa tcagatatatt gggttaaagg aattatttaa ttggctgcac cctcgccttg 10740
 aaaagagtac aatatatggt ggagatcctt attgcccgcc atcagatatt gaacatttac 10800
 cacttgatga ccatcctgat tcaggatttt atgttcataa tcctaaagga ggaatagaag 10860
 ggttttgccaa aaagttatgg aactcatat ctatcagtgc catacattta gcagctgtca 10920
 aaatcgggtg aagagttact gcaatgggtc aaggggataa tcaagccata gctgttacca 10980
 ccagagtacc taataattat gattataagg ttaagaaaga gattgtttat aaagatgtgg 11040
 taagatTTTT tgattctttg agagagggtta tggatgatct gggctcatgag ctcaaactaa 11100
 atgaaactat aataagtagt aaaatgttta tatatagcaa aaggatatac tatgacggaa 11160
 gaatccttcc tcaggcggtta aaagcattgt ctagatgtgt tttttgggtc gaaacaatca 11220
 tagatgagac aagatcagca tcctcaaatc tggcgacatc gtttgcaaag gccattgaga 11280
 atggctactc acctgtattg ggatattgat gctcaatctt caaaaatatc caacagttgt 11340
 atatagcact tggaatgaat ataaatccaa ctataaccca aaatattaaa gatcaatatt 11400
 tcaggaatat tcattggatg caatatgcat ctctaattcc tgctagtgtc ggaggattta 11460
 atttatggc catgtcaagg tgttttgtca gaaacattgg agatcctaca gtcgctgcat 11520
 tagctgatat taaaagattt ataaaagcaa atttgttaga tcgagggtgc ctttacagaa 11580
 ttatgaatca ggaaccaggc gagtcctcct ttttagactg ggcttcagac ccctattcat 11640
 gtaacttacc acaatctcaa aatataacca ccatgataaa gaatataact gcaagaaatg 11700
 tactacagga ctcaccaaac ccattactat ctggattatt tacaagtaca atgatagaag 11760
 aggatgagga attagctgag ttctaattgg acaggagaat aattctccca agggttgcgc 11820
 atgacatttt agataattct ctactggaa ttaggaatgc tatagctggg atgttgata 11880
 caacaaaatc actaattcga gtagggataa acagaggagg attaacctat aacttattaa 11940
 gaaagataag caactatgat cttgtacaat atgagacact tagtaaaact ttaagactaa 12000
 tagtcagtga caagattaag tatgaagata tgtgctcagt agacctagcc atatcattaa 12060
 gacaaaaaat gtggatgcat ttatcaggag gaagaatgat aaatggactt gaaactccag 12120
 atcctttaga gttactgtct ggagtaataa taacaggatc tgagcattgt aggatatgtt 12180
 attcaactga aggtgaaagc ccatatacat ggatgtattt accaggcaat cttaatatag 12240
 gatcagctga aacaggaata gcatcattaa gggccctta ctttgatca gttacggatg 12300
 agagatctga agcacaattg gggatatca aaaatctaag caaaccagct aaggctgcta 12360
 taagaatagc aatgatatat acttgggcat ttgggaatga cgaaatatct tggatggaag 12420
 catcacagat tgcacaaaca cgtgcgaact ttacattaga tagcttaaag attttgacac 12480
 cagtgacaac atcaacaaat ctatcacata gggtaaaaga tactgctact cagatgaaat 12540
 tttctagtac atcacttatt agagtaagca gggtcatcac aatatctaata gataatatgt 12600
 ctattaaaga ggcaaatgaa actaaagata caaatcttat ttatcaacag gtaatgttaa 12660

cagggttaag tgtatttgaa tatctattta ggtagagga gtagacagga cataacccta 12720
tggtcatgca tctacatata gaggatggat gttgtatcaa agagagttac aatgatgagc 12780
atatcaatcc ggagtctaca ttagaggttaa ttaaataccc tgagagtaat gaatttatat 12840
atgataagga cccttttaag gatatagatc tatcaaaatt aatgggtata agagatcatt 12900
cttatacaat tgacatgaat tactgggacg acacagatat tgtacatgca atatcaatat 12960
gtactgcagt tacaatagca gatacaatgt cgcagctaga tcgggataat ctttaaggagc 13020
tggttgtaat tgcaaatgat gatgatatta acagtctgat aactgaattt ctgaccctag 13080
atatactagt gtttctcaaa acatttggag gggtactcgt gaatcaattt gcatataccc 13140
tttatggatt gaaaatagaa ggaagggatc ccatttggga ttatataatg agaacattaa 13200
aagacacctc acattcagta cttaaagtat tatctaattg actatctcat ccaaaagtgt 13260
ttaagagatt ttgggattgt ggagttttga atcctattta tggtcctaact actgctagtc 13320
aggaccaagt taagcttgct ctctcaattt gcgagtactc cttggatcta tttatgagag 13380
aatggctgaa tggagcatca cttgagatct atatctgtga tagtgacatg gaaatagcaa 13440
atgatagaag acaagcattt ctctcaagac accttgcctt tgtgtgttgt ttagcagaga 13500
tagcatcttt tggaccaaatt ttattaaatc taacatatct agagagactt gacgaattaa 13560
aacaatactt ggatctgaac atcaaagaag atcctactct taaatatgtg caagtatcag 13620
gactgttaat taaatcattc ccctcaactg ttacgtatgt gaggaaaact gcgattaagt 13680
atctgaggat tcgtggcatt aatccgcctg aaacgattga agattgggat cccatagaag 13740
atgagaatat cttagacaat attgttaaaa ctgtaaata caattgcagt gataatcaaa 13800
agagaaataa aagtagttat ttctggggat tagctctaaa gaattatcaa gtcgtaaaaa 13860
taagatccat aacgagtgat tctgaagtta atgaagcttc gaatgttact acacatggaa 13920
tgacacttcc tcaggaggga agttatctat cacatcagct gaggttattt ggagtaaaca 13980
gtacaagttg tctgaaagct cttgaattgt cacaaatttt aatgagggaa gttaaaaaag 14040
ataaagatag actcttttta ggagaaggag caggagctat gttagcatgt tatgatgcta 14100
cactcgggtc tgcaataaat tattacaatt ctgggtttaa tattacagat gtaattgggtc 14160
aacgggaatt aaaaatcttc ccatcagaag tatcattagt aggtaaaaaa ctaggaaatg 14220
taacacagat tcttaatcgg gtgagggtgt tatttaatgg gaatcccaat tcaacatgga 14280
taggaaatat ggaatgtgag agtttaatat ggagtgaatt aaatgataag tcaattgggt 14340
tagtacattg tgacatggag ggagcgatag gcaaatcaga agaaactgtt ttacatgaac 14400
attatagtat tattaggatt acatatttaa tcggggatga tgatgttgct ctagtatcaa 14460
aaattatacc aactattact ccgaattggt ctaaaatact ctatctatac aagttgtatt 14520
ggaaggatgt aagtgtagt tcccttaaaa catccaatcc tgcctcaaca gagctttatt 14580
taatttcaaa ggaatgctac tgtactgtaa tggaaccag taatcttggt ttatcaaaac 14640
ttaaaaggat atcatcagta gaagaaaata atctattaaa atggataatc ttatcaaaaa 14700
ggaagaacaa cgaatgggta cagcatgaaa tcaaagaagg agaaaggat tatgggataa 14760
tgaggccata tcatacagca ctgcaaat tgggattcca aattaactta aatcacttag 14820
ctaaagaatt tttatcaact cctgatttaa ccaacattaa taatataatt caaagtttta 14880

caagaacaat taaagatggt atgttcgaat gggccaatat cactcatgac aataaaagac 14940
 ataaattagg aggaagatat aatctattcc cgcttaaaaa taagggaag ttaagattac 15000
 tatcacgaag attagtacta agctggatat cattatcttt atcaaccaga ttactgacag 15060
 gccgtttccc agatgaaaaa ttgaaaaata gggcacagac cggatatgta tcattggctg 15120
 atactgattt agaatcttta aagttattat caagaaatat tgtcaaaagt tacaagaac 15180
 acataggatt aatatcatat tggtttttaa ccaaagaggt caaaatacta atgaaactta 15240
 tagggggagt caaactacta ggaattccca aacagtacaa agagttagag gatcgatcat 15300
 ttcagggtta tgaatatgat aatgaatttg atattgatta atacataaaa acaaaaaata 15360
 aaacacctaa tcctctccca ttcacttcca acaaaatgaa aagtaagaaa aacatataat 15420
 atacatatac caaacagagt ttttctcttg tttggt 15456

<210> 24
 <211> 12
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Sequence flanking site for introduction of Bsi W1 site for rHPiV3
 JS

<400> 24 12
 tagacaaaag gg

<210> 25
 <211> 12
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Sequence flanking site for introduction of Bsi W1 site for rBPiV3
 Ka

<400> 25 12
 aagatataaa ga

<210> 26
 <211> 12
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Sequence flanking site for introduction of Bsi W1 site for rHPiV3
 s

<400> 26 12
 tagacgtacg gg

<210> 27
 <211> 12
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Sequence flanking site for introduction of Bsi W1 site for rBPiV3

<400> 27 12
 aagacgtacg ga

<210> 28
<211> 12
<212> DNA
<213> Artificial Sequence

<220>
<223> Sequence flanking Sgr A1 site in rHPiV3 sFBHNB

<400> 28
cgcaccggtg ca

12

<210> 29
<211> 12
<212> DNA
<213> Artificial Sequence

<220>
<223> Sequence flanking Bsi W1 site in rHPiV3 sFBHNB

<400> 29
aagacgtacg gg

12

<210> 30
<211> 12
<212> DNA
<213> Artificial Sequence

<220>
<223> Sequence flanking Sgr A1 site in rBPiV3 sFHHNH

<400> 30
tccaccggtg ta

12

<210> 31
<211> 12
<212> DNA
<213> Artificial Sequence

<220>
<223> Sequence flanking Bsi W1 site in rBPiV3 of sFHHNH

<400> 31
tagacgtacg ga

12